

CLAIMS

I claim:

1. A thallium-free metal halide fill for a discharge lamp, the fill comprising:

mercury,
sodium iodide,
an alkaline earth iodide selected from calcium iodide,
strontium iodide, barium iodide, or combinations
thereof, and
a rare-earth iodide selected from cerium iodide,
dysprosium iodide, holmium iodide, thulium
iodide, or combinations thereof;

wherein the molar ratio of sodium iodide to alkaline-earth iodide is from about 0.6 to about 11, the molar ratio of sodium iodide to rare-earth iodide is from about 0.5 to about 2.8, and the molar ratio of alkaline-earth iodide to rare-earth iodide is from about 0.1 to about 2.

2. The thallium-free metal halide fill of claim 1 wherein the fill further contains lithium iodide in an amount up to about 30 mole percent of the total metal iodide content.

3. A thallium-free metal halide fill for a discharge lamp, the fill comprising: mercury and a mixture of metal halide salts, the mixture containing about 25 to about 55 mole percent sodium iodide, about 20 to about 50 mole percent of a rare-earth iodide selected from cerium iodide, dysprosium iodide, holmium iodide, thulium iodide, or combinations thereof, and about 5 to about 40 mole percent of an alkaline-earth iodide selected from calcium iodide, strontium iodide, barium iodide, or combinations thereof.

4. The thallium-free metal halide fill of claim 3 wherein the fill further contains lithium iodide in an amount up to about 30 mole percent of the total iodide content.

5. A discharge lamp for emitting white light comprising: a base and an outer jacket enclosing a ceramic discharge vessel, the ceramic discharge vessel enclosing a discharge chamber containing a thallium-free metal halide fill, the discharge vessel having at least one hermetically sealed electrode assembly which extends into the discharge chamber and has an electrical connection to the base in order to generate an arc discharge within the discharge chamber;

the thallium-free metal halide fill comprising mercury, and a mixture of metal halide salts, the mixture containing sodium iodide, an alkaline earth iodide selected from calcium iodide, strontium iodide, barium iodide, or combinations thereof, and a rare-earth iodide selected from cerium iodide, dysprosium iodide, holmium iodide, thulium iodide, or combinations thereof; and

when in operation, the x,y color coordinates of the emitted light when plotted on a chromaticity diagram move in a direction generally parallel to the Planckian locus as the lamp is dimmed below its rated power.

6. The discharge lamp of claim 5 wherein the molar ratio of sodium iodide to alkaline-earth iodide is from about 0.6 to about 11, the molar ratio of sodium iodide to rare-earth iodide is from about 0.5 to about 2.8, and the molar ratio of alkaline-earth iodide to rare-earth iodide is from about 0.1 to about 2.

7. The discharge lamp of claim 6 wherein the discharge vessel contains argon gas at a pressure from 30 torr to 300 torr.

8. The discharge lamp of claim 5 wherein the lamp has a rated power of 70 watts.

9. The discharge lamp of claim 5 wherein the mixture contains about 25 to about 55 mole percent sodium iodide, about 20 to about 50 mole percent of a rare-earth iodide selected from cerium iodide, dysprosium iodide, holmium iodide, thulium iodide, or combinations thereof, and about 5 to about 40 mole percent of an alkaline-earth iodide selected from calcium iodide, strontium iodide, barium iodide, or combinations thereof.

10. The discharge lamp of claim 6 wherein the fill further contains lithium iodide in an amount up to about 30 mole percent of the total metal iodide content.

11. The discharge lamp of claim 9 wherein the fill further contains lithium iodide in an amount up to about 30 mole percent of the total metal iodide content.

12. The discharge lamp of claim 9 wherein the discharge vessel contains argon gas at a pressure from 30 torr to 300 torr.

13. The discharge lamp of claim 9 wherein the lamp is dimmed to about 60% of its rated power.

14. A discharge lamp for emitting white light comprising: a base and an outer jacket enclosing a ceramic discharge vessel, the ceramic discharge vessel enclosing a discharge chamber containing a thallium-free metal halide fill, the discharge vessel having at least one hermetically sealed electrode assembly which extends into the discharge chamber and has an electrical connection to the base in order to generate an arc discharge within the discharge chamber;

the thallium-free metal halide fill comprising:
mercury,
sodium iodide,

an alkaline earth iodide selected from calcium iodide, strontium iodide, barium iodide, or combinations thereof, and

a rare-earth iodide selected from cerium iodide, dysprosium iodide, holmium iodide, thulium iodide, or combinations thereof;

wherein the molar ratio of sodium iodide to alkaline-earth iodide is from about 0.6 to about 11, the molar ratio of sodium iodide to rare-earth iodide is from about 0.5 to about 2.8, and the molar ratio of alkaline-earth iodide to rare-earth iodide is from about 0.1 to about 2.

15. The thallium-free metal halide fill of claim 14 wherein the fill further contains lithium iodide in an amount up to about 30 mole percent of the total metal iodide content.

16. The discharge lamp of claim 14 wherein the discharge vessel contains argon gas at a pressure from 30 torr to 300 torr.

17. The discharge lamp of claim 5 wherein the lamp when operated at its rated power exhibits a correlated color temperature within the range from about 4000K to about 5000K, a CRI greater than about 80, and an efficacy greater than about 80 LPW.

18. The discharge lamp of claim 14 wherein the lamp when operated at its rated power exhibits a correlated color temperature within the range from about 4000K to about 5000K, a CRI greater than about 80, and an efficacy greater than about 80 LPW.